

V2

DRIVE STARTUP MANUAL

DSD412

VERSION 2.0



SMARTRISE

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Document History

Date	Version	Summary of Changes
May 14, 2015	1.0	Initial Submittal
December 17, 2019	2.0	Changed cover page New document format Reworked display screen shots to display as viewed Expanded on step by step procedures Replaced Construction section to include wiring to the CXN board Update Accucoder encoder wiring

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DSD412 Drive

The DSD412 drive is a DC drive.



Figure 1: DSD412 Drive

Equipment/Settings Verification

Set and verify the equipment matches the job specific parameters for proper operation. See V2 Controller sheet 01 Getting Started Parameter Table for more information.

Job Specifications:															
Car	Group #	Group Car ID	Contract Speed	Floors	Capacity	Main Line Voltage	Motor Volts	Motor HP	Motor FLA	ISO kVA	Minimum ISO AMG	Minimum Drive AMG	Minimum Motor AMG	Disc. Size	Drive Ripple Filter
1	1	1	500	18	3500	460	225	40	150	52	3	1/0	1/0	110	S3ST1259-3A00 300-5043-101

Car	Doors	DR Breaker Voltage	Brake Pick	Brake Hold	Brake Ohm	Brake Amp	M. Cont. P/N	B.1 Cont. P/N	Encoder PPR	EBrake	DBR Ohm	DBR Watts
1	1	240	54.5	35	5.2	10.5	EHDB220C-1L	CAT-12	10000	DRAKA	0.3416	1313

Motor Volts	Motor Amps	Main Line Volts	Motor HP
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Brake Volts Pick/Hold	Encoder PPR
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Figure 2: Example of Parameter Table

Grounding Requirements

NOTE: A proper and effective building ground connection is required for the safe and successful operation of the controller.

Examples of a proper building-to-controller ground is as follows:

1. Attach the ground wire to the street side of a water main.
2. Attach the ground wire to a grounding rod in the pit.

The controller has a common ground bus terminal connection.



Figure 3: Ground Bus Terminal

The building, motor, transformer, and filter(s) must all share a common ground. This removes ground loops, limits impedance, and routes noise into the ground.

Wiring

A checklist must be completed during the drive wiring process. See Appendix for terminal locations.

Power

Perform the following to connect power. See *V2 Controller sheet 03 Machine Room* for job specific information.

- Connect main line power to terminal blocks L1/L2/L3.
- Connect the ground wire to the yellow/green terminal block next to L1-L3.

Brake

Perform the following to connect the brakes. See *V2 Controller* sheet *05 Brakes* for job specific information.

- Connect the main brake wiring to terminals K1/K2 and the secondary brake wiring (if equipped) to terminals J1/J2 located on the terminal block next to the M Contactor.

Motor/Encoder

Perform the following to connect the drive to the motor and encoder cable. See *V2 Controller* sheet *04 Drive and Motor* for job specific information.

- Connect motor leads to the M contactor at T1/T2/T3.
- Connect the encoder cable to the TB1 encoder terminal block located under the lower cover.

The table below lists the Wiring References for Common Encoders.

Table 1: Wiring References for Common Encoders

Encoder	Drive	Imperial 35'	Imperial 50'/75'	Accucoder	Wachendorff	IH740/IH950	Industrial
PWR	IP	Red	White	Brown	Brown	Brown	Brown
COM	IG	Black	Black	Blue	White	White	White
A	A+	White	Purple	White	Green	Green	Green
/A	A-	White/Black	Gray	Green	Red	Pink	Pink
B	B+	Blue	Green	Yellow	Yellow	Yellow	Yellow
/B	B-	Red/Black	Blue	Gray	Black	Blue	Blue
Z		Orange			Gray	Gray	Gray
/Z		Green			Violet	Red	Red
CLK+	CK						
CLK-	\overline{CK}						
DAT+	DT						
DAT-	\overline{DT}						
SHIELD	FE	Shield	Shield	Shield	Shield	Shield	Shield

Construction

Perform the following to wire the construction box. See *V2 Controller* sheet *01 Getting Started* for job specific information.

1. Install jumpers between M24 and Input/Output (IO) as per print.

2. Using an external run box?
 - a. If using an external run box, go to step 3.
 - b. If not using an external run box, go to step 5.
3. Remove factory wires on inputs 521 and 522.
4. Install the Run Bug UP/DOWN switch to IOs 521 and 522.
5. Install the Run Bug UP/DOWN SAFE switch to M24.
6. Install the Temporary Run switch between 120 and SFIN on the CXN board and 120 to THL, MHL, and BHL on the CXN board.
7. Are there two sheave brakes and no rope gripper?
 - a. If there are two sheave brakes and no rope gripper, go to step 8.
 - b. If there is a rope gripper or a single sheave brake, the process ends.
8. Install a jumper between EB and SOUT.

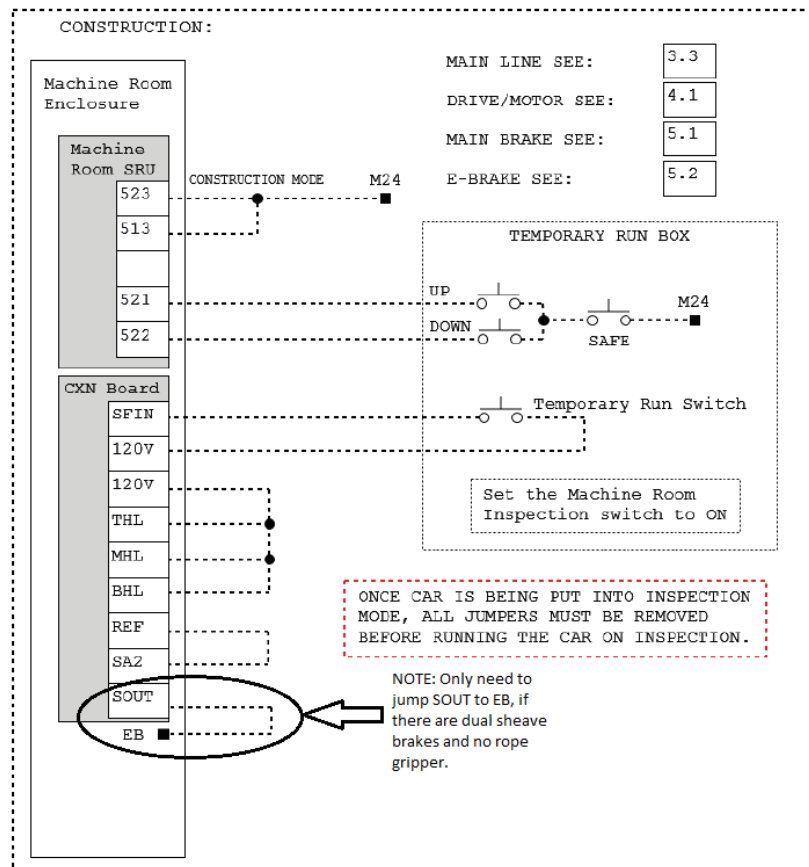


Figure 4: Example of Construction Wiring

Powering Up

Perform the following to power-up the drive.

1. Apply external power by closing the main disconnect.
2. Close the two-pole breaker and all pushbutton breakers.
3. Verify the LCD on the Smartrise board and the Magnetek Drive powers up.

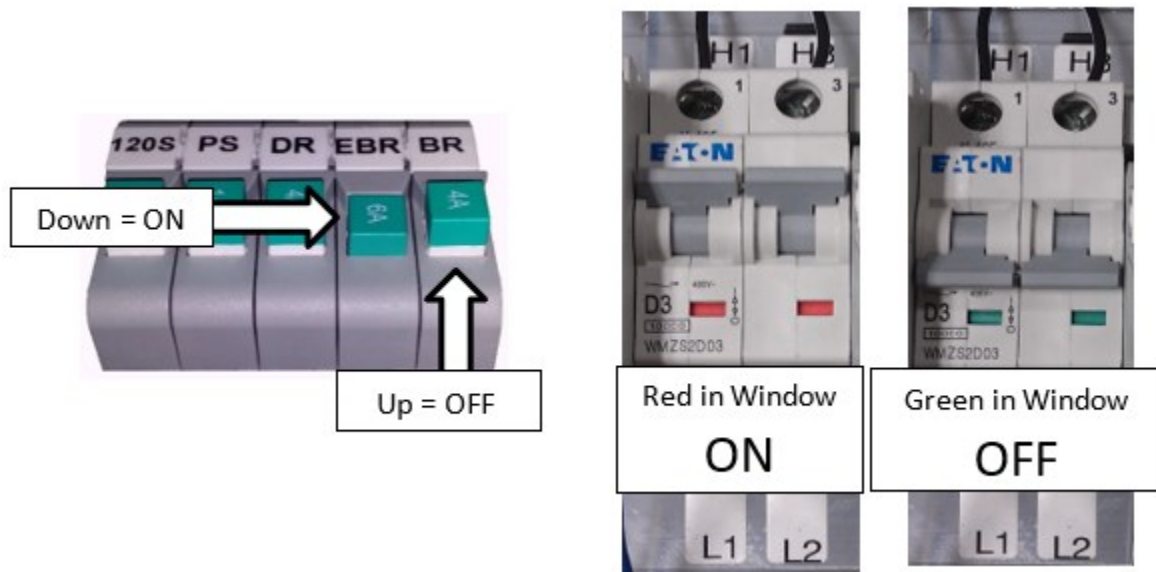


Figure 5: Breakers

Final Setup

Perform the following to set the Bypass Term Limit.

NOTE: The selected menu within the menu options is shown with a *.

1. Toggle the Inspection/Normal switch to Inspection.
2. On the Smartrise Machine Room board, press the left arrow (ESC) button several times to get to the MAIN SCREEN.
3. Press the right button to access the Main Menu.
4. From the MAIN MENU, scroll and select Setup.



Figure 6: MAIN MENU – Setup

- From the SETUP menu, scroll and select Misc.



Figure 7: SETUP Menu – Misc

- From the MISC menu, scroll and select Bypass Term Limits.

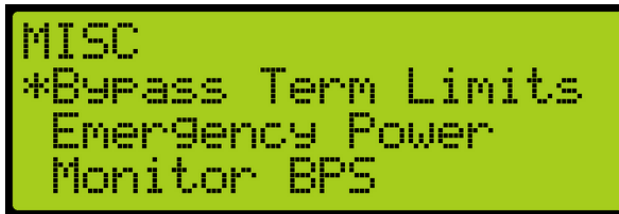


Figure 8: MISC Menu – Bypass Term Limits

- From the BYPASS TERM LIMITS menu, set the bypass term limits from NO to YES.



Figure 9: Bypass Term Limits Menu – NO

- Scroll and change NO to YES.

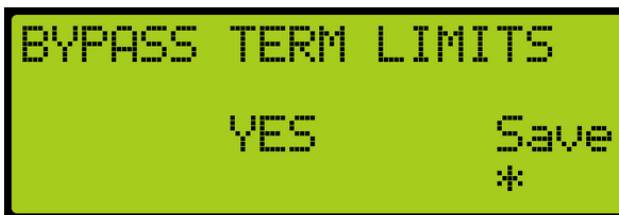


Figure 10: Bypass Term Limits Menu – YES

- Scroll right and press Enter to save.
- Press the left button several times to get to the MAIN SCREEN.
- Verify the LCD displays Construction Mode on the MAIN SCREEN.

Perform the following connections as shown in the figures below. Attach a voltmeter across the 115 VAC source for the control power supply at A4TB3-1 and A4TB3-7.

1. Attach L1, L2, and L3 to the corresponding terminals on the drive.

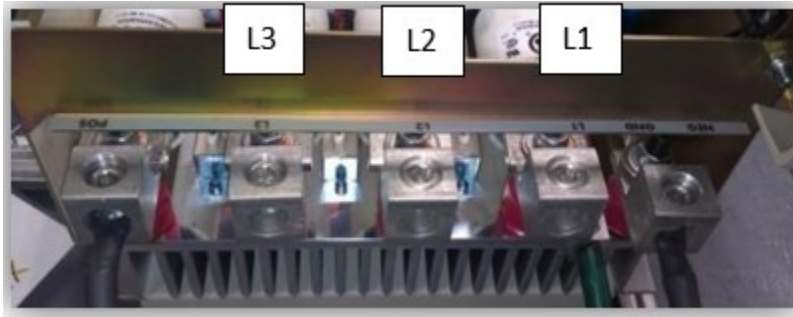


Figure 11: Terminal Connections

2. Attach wires from the L2 and L2 terminals to the L1 and L2 terminal block on the DIN rail.

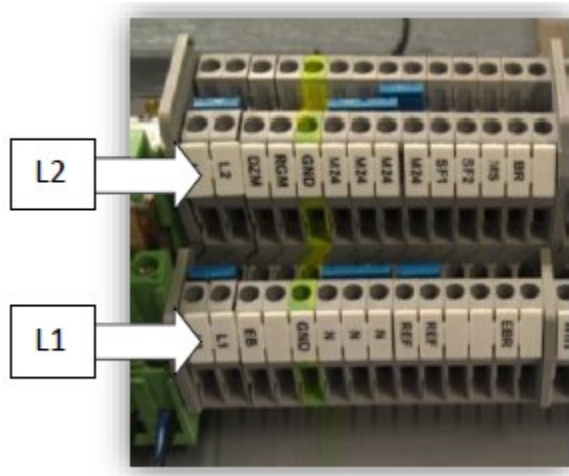


Figure 12: L1 and L2 Connections

3. Connect the armature wiring to the terminal block according to the amperage rating listed on the motor. Make sure to set the DIP switch to the value that matches the amperage rating.

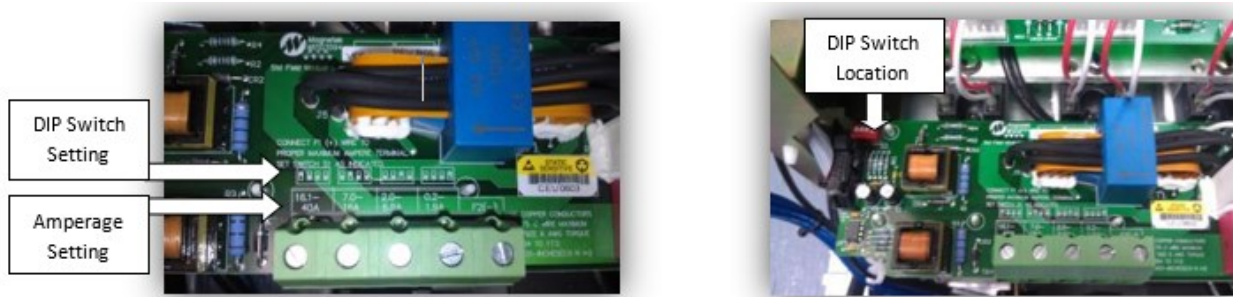


Figure 13: DIP Switch

4. If the encoder has not been connected, connect the encoder to TB1 using the color codes provided by the manufacturer or Table 1.

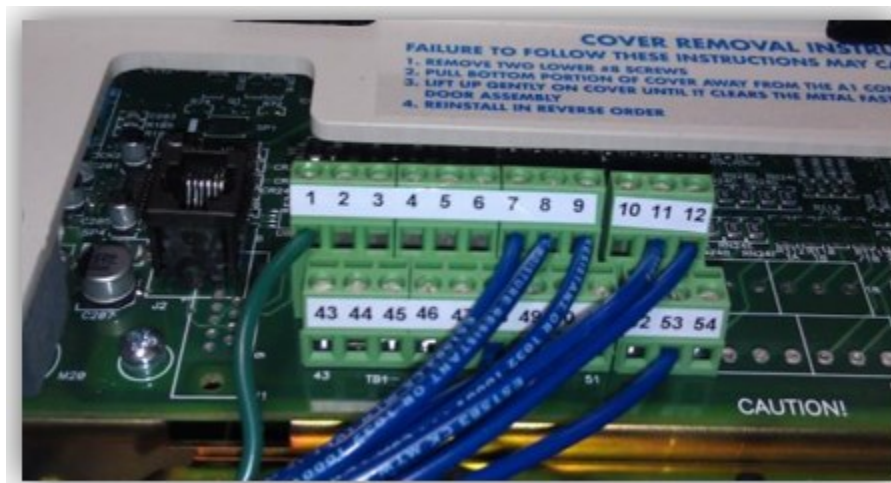


Figure 14: Encoder Connection

5. Apply the control and three-phase power. Verify that the control power is between 103 VAC and 126 VAC.
6. Press the RESET push button on the front of the power cube and observe the drive power-up sequence. See Drive Power-Up Sequence.

Drive Power-Up Sequence

The power-up sequence can be observed by monitoring the Standard Control/Display Unit (SCDU) on the front of the power cube.

1. When power is initially applied, all segments on the digital LED display and all of the LEDs come on for about 1 second.

2. The LEDs and display should turn off. The drive performs internal checks. The SCDU displays tEst while a self-test is being performed.
3. If the drive passes the self-test, then the SCDU displays P-UP.
4. The READY LED comes on.

Abnormal Display Conditions

If an error or fault has occurred, the display shows an abnormal condition.

The following is a list of Abnormal Display Conditions and Solutions.

Table 2: Abnormal Display Conditions and Solutions

Condition	Solution
No digits or LEDs come on	Check for proper voltage between the 115 VAC control power lines. Check for blown 115 VAC control power fuses. Check for a defective Control Voltage Power Supply in the power cube.
Horizontal segment(s) of the SCDU display are lit	One or more phases of the three-phase power is missing. Measure and verify three-phase power input at the drive terminals. Check the three-phase power fuses.
FAULT LED lights and a fault code appears on the SCDU	See the Fault/Error Codes List to see what caused the fault and to find the correct solution. See the <i>Hydraulic, AC Traction, and DC Traction Controllers Equipment Installation Manual</i> , section <i>Faults and Alarms</i> . A fault code is displayed as the letter 'F' followed by a number representing the fault.
SCDU displays Prot	The initial checks found that the protected non-volatile RAM (NVRAM) has not been initialized. Move the NVRAM PROTECTION switch to OFF in order to allow the microprocessor to initialize the NVRAM with preprogrammed default values. Notice that the NV RAM UNPROTECTED LED is now lit to indicate the NV RAM PROTECTION switch position. Press the RESET push button. The drive goes through its power-up sequence again; however, this time it will initialize the unprotected NVRAM and load in factory supplied default parameter values.

The figure below shows the location of the NVRAM Protection switch when troubleshooting a SCDU displays Prot fault.



Figure 15: NVRAM Protection Switch

Fan Check

Verify fans are working if a blower motor (power bridge fan) is installed on a drive.

Verify Parameters

When the READY LED on the SCDU is lit, all the selectable parameter data needs to be checked and/or verified to the proper values (see *V2 Controller sheet 04 Drive and Motor*) as follows:

- VERIFY OR CHANGE EACH PARAMETER VALUE for the particular application and motor involved.
- STORE PARAMETERS, Function # 994, so that power can be removed and reapplied without losing the entered parameters.
- Set the NVRAM PROTECTION switch to the protect position (UN PROT NV RAM light is off) to ensure that set up data cannot be corrupted.
- Operate the drive using external control signal inputs shown on the *V2 Controller sheet 04 Drive and Motor*.

The table below lists the Magnetek DSD412 Parameters.

Table 3: Magnetek DSD412 Parameters

Parameter	Description	Recommended Value	Additional Information
2	Use Self-Tune Logic	On	This parameter cannot be set to ON until performing the self-tune.
3	Rated Armature Current	Motor Name Plate	
7	Rated Armature Voltage	Motor Name Plate	

Parameter	Description	Recommended Value	Additional Information
9	Nominal AC Voltage	Drive Supply Voltage	This is the voltage coming into the drive. Not necessarily the line voltage if a step-up or step-down transformer is being used.
10	Encoder PPR	Per Encoder	
11	Motor RPM	Motor Name Plate	
17	Rated Car Speed	Per Job Specification	
49	Weak Field Current	Motor Name Plate	If this value is greater than the rated field current, then the field will never weaken.
50	Rated Field Current	Motor Name Plate	The drive must be configured for the correct field current range. See the <i>Magnetek DSD 412</i> Manual for DIP switch settings.
52	Rated Field Voltage	Motor Name Plate	
53	Standby Field Current	25%	This parameter cannot be set to ON until performing the self-tune.
115	Run-Up/Run-Down SEL	On	Must be ON for compatibility with Smartrise controller.
150	Binary Speed Select	On	Must be ON for compatibility with Smartrise controller.
151	Speed 1 Reference	10	Smartrise Speed: Leveling
153	Speed 3 Reference	50	Smartrise Speed: Inspection
154	Speed 4 Reference	Per Job	Smartrise Speed: S1
155	Speed 5 Reference	Per Job	Smartrise Speed: S2
156	Speed 6 Reference	Per Job	Smartrise Speed: S3
157	Speed 7 Reference	Per Job	Smartrise Speed: S4
170	Acceleration #1 Time	5.00	
172	Deceleration #1 Time	5.00	
174	Acceleration #1 %S Time	25.00	
176	Deceleration #1 %S Time	25.00	

Magnetek DSD412 Drive Self-Tune Procedure

Perform the Magnetek DSD412 drive self-tune procedure as follows:

1. Place a jumper from 120 on the DIN rail to Terminal 11 on the LPR relay.
2. Put the NVRAM Protected switch in the Not Protected position.
3. Perform PCU DIAGNOSTICS Function # 998 to verify armature and field circuitry.
4. Perform SELF-TUNE PARAMETER TEST Function # 997. The drive should display PASS after a few seconds. Set Parameter #2 to ON.

5. Remove the jumper and perform Function #994 to permanently save the changed values.
6. Set the BYPASS TERM LIMITS to YES. See Final Setup for more information.
7. Verify the Smartrise Machine Room board LCD is not showing an active fault as indicated by a flashing Red LED, and it displays Construction Mode.
8. Close the Run Bug Stop switch.
9. Command the Car to move.
10. Verify the brake is picking/holding after a valid run command is given.
11. Verify the brake is dropping once the command is removed.
12. Verify the timing and operation of the brake to ensure the motor is not running through the brake prior to it picking.
13. Does the Brake Pick need to be adjusted?
 - a. If the Brake Pick needs to be adjusted, go to step 14.
 - b. If the Brake Pick does not need to be adjusted, the process is complete.
14. On the Smartrise Machine Room controller board, press the left arrow (ESC) button several times to get to the MAIN SCREEN.
15. Press the right button to access the Main Menu.
16. From the MAIN MENU, scroll and select Setup. See Figure 6.
17. From the SETUP menu, scroll and select Timers.



Figure 16: SETUP Menu – Timers

- a. From the TIMERS menu, scroll and select the:
 - Brake Pick Delay – The brake pick delay is the amount of time for the brake to lift before a non-zero speed is given.
 - Brake Hold Time – The brake hold time is the duration time between the brake pick and brake hold.
 - Brake Drop (Norm) – The brake drop (norm) is the amount of time the brake remains lifted after the car is given a zero-speed command.

The example below shows the Brake Pick Delay.



Figure 17: TIMERS Menu – Brake Pick Delay

- b. From the Brake Pick Delay menu, select the delay time for the brake to lift.



Figure 18: Brake Pick Delay Menu

- c. Scroll right and press Enter to save.

18. Is the brake inoperative?

- a. If the brake is operative, go to step 19.
- b. If the brake is inoperative, check the following:
 - Check for DC voltage between points K1 and K2 on the Machine Room DIN rail.
 - Verify this voltage is also at the brake coil when commanded to pick.
 - Ensure this voltage corresponds to the voltage the brake coil is rated for.
 - If problems persist, contact Smartrise for assistance.

19. The encoder feedback may be out of phase upon first power-up. This may cause the motor to run faster than commanded and/or give drive fault 408/98. Is the encoder feedback out of phase?

- a. If the encoder feedback is in phase upon first powering up, go to step 20.
- b. If the encoder feedback is out of phase upon first powering up, remove line power and swap the encoder A+ and A- wires. Go to step 20.

20. Reapply line power and command the car to move. The car should now move at the programmed Inspection Speed.

21. Is the motor running in a reverse direction from what is commanded?

- a. If the motor is running in the forward direction, go to step 22.
- b. If the motor is running in a reverse direction from what is commanded, swap the field (+) and (-) wires. It may be necessary to swap the encoder A+ and A- wires after changing the field wires. Go to step 22.

22. Set the BYPASS TERM LIMITS to NO. See Final Setup for more information.

Shuddering at High Speed

At times, shuddering may occur. If shuddering at high speed occurs, verify the following conditions:

- Motor voltage vs. transformer secondary input voltage – Recommendation is that the transformer secondary voltage, at a minimum, be equal to the rated armature VDC. For best results that account for sagging utility, etc., $VAC = 1.05 \times VDC$ is a better number to use.
- Make sure that the motor weak field current is adjusted so that with full load up at rated speed yields, the rated armature VDC used above.
- Rope resonance – Use the high speed/low speed bandwidth adjustments (#39 and 40). Reduce the setting of the high speed and width to maybe 50% of that for low speed. Set the gain change speed (#105) at 25-50% of rating. Elevator speeds of 350-500 with 2:1 roping can be problematic. Using the notch filter may help (#190, 191).
- Make sure there is no slop/backlash in the encoder coupling and that the encoder is not wobbling or vibrating.
- Keep Tach Rate Gain (#107) at zero.
- Verify the correct motor and encoder data, perform diagnostics (#998) and self-tune (#997), and use the values for self-tune (#4, 6, and 51) by copying them from (#613, 614, and 615) and then turning #2 to ON.
- Reduce motor armature response (#8) to 250 r/sec.
- Make sure there is a ground bonding wire from motor frame to drive chassis.
- Make sure the encoder is electrically insulated from the motor shaft and frame.
- If using a friction wheel encoder, make sure both surfaces are perfectly round.

Operation

Run the car and complete the checklist during the verification process.

No Faults

Make sure the car is moving without triggering a fault either on the Smartrise SRU board or the drive. If the SRU board displays a drive fault, look at the drive to see what the fault is. See Drive Fault/Encoder Fault for troubleshooting drive fault.

Proper Direction

Make sure the car is moving in the same direction as the control switch on the Run Bug. See Wrong Direction for troubleshooting proper direction faults.

At Speed

Make sure the car is moving at the proper inspection speed (approximately 50 fpm). See Car Moving to Slow or Rough for troubleshooting at speed faults.

Under Control

Make sure that the car is moving under full control. The car should stop when commanded from the Run Bug. Verify that the car runs with no faults for 10 seconds or more. See Brake Not Lifting for troubleshooting under control faults.

Troubleshooting

The following sections list troubleshooting procedures.

Drive Fault/Encoder Fault

The most common fault at startup with a Magnetek drive is the Encoder fault.

Perform the following checks to correct this fault:

- Check for a solid shield-to-ground connection at the motor and drive.
- Check for correct colored encoder wires to the terminals.
- Swap A+ and / A- on terminal TB1.

Brake Not Lifting

If the brake is not picking, make sure that the brake is wired according to *V2 Controller sheet 05 Brake Options* and verify that the EB terminal is jumpered to the terminal. See *V2 Controller sheet 01 Getting Started* for more information.

If the brake has the proper voltage check the following:

- During a run command, check the DC voltage between points K1/K2 and J1/J2 if secondary brake is installed. Verify the voltages are also at the brake coil(s) when commanded to pick.
- Verify that the actual brake voltage matches the brake coil voltage shown on *V2 Controller sheet 01 Getting Started Parameter table*.

Wrong Direction

If the car is moving in the wrong direction check the following:

- On the Smartrise Controller board make sure that IO 521 comes on when commanding the UP direction and IO 522 comes on when commanding the DOWN direction.

Car Moving to Slow or Rough

If the car is moving to slow or rough, perform the following:

- Swap the encoder wires A+ and A- on drive TB1.
- Verify the brakes are lifting fully.

Appendix

The figure below shows the terminal locations.

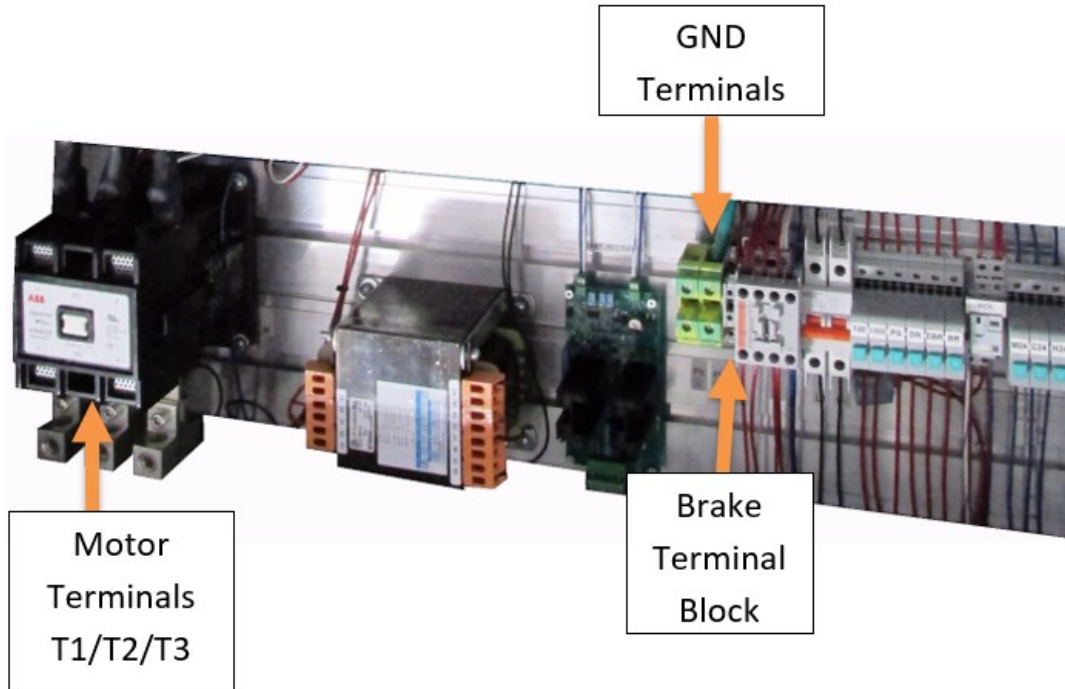


Figure 19: Terminal Locations

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